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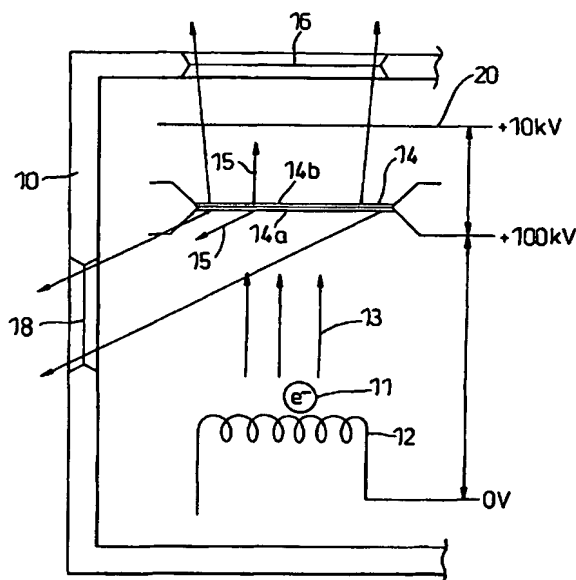
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[Continued on next page]

(54) Title: X-RAY TUBES



(57) Abstract: An X-ray tube comprises an electron source in the form of a cathode (12), and an anode (14) within a housing (10). The anode (14) is a thin film anode, so that most of the electrons which do not interact with it to produce X-rays pass directly through it. X-rays can be collected through a first window (16) directly behind the anode (14), or a second window (18) to one side of the anode. A retardation electrode 20 is located behind the anode (14) and is held at a potential which is negative with respect to the anode (14), and slightly positive with respect to the cathode (12). This retardation electrode (20) produces an electric field which slows down electrons passing through the anode (14) so that, when they interact with it, they are at relatively low energies. This reduces the heat load on the tube.



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B. FIELDS SEARCHED

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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 23, 10 February 2001 (2001-02-10) & JP 2001 176408 A (NEW JAPAN RADIO CO LTD), 29 June 2001 (2001-06-29) abstract; figures 2-4	1-11
Y	EP 0 432 568 A (GENERAL ELECTRIC COMPANY) 19 June 1991 (1991-06-19) page 3, column 3, line 22 - line 37	1-11
Y	PATENT ABSTRACTS OF JAPAN vol. 016, no. 294 (E-1225), 29 June 1992 (1992-06-29) & JP 04 079128 A (NEC CORP), 12 March 1992 (1992-03-12) abstract; figure 1	5
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☒ Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 887 604 A (SHEFER ET AL) 19 December 1989 (1989-12-19) column 7, line 3 - line 23; figures 4,5	11
A	US 3 239 706 A (FARRELL SHERMAN R ET AL) 8 March 1966 (1966-03-08) column 1 - column 3; figure 1	1-11
A	EP 0 584 871 A (TAN, DAGANG, DR) 2 March 1994 (1994-03-02) page 4, line 18 - line 41; figure 2 page 2, line 1 - line 12	
A	SU 1 022 236 A1 (INST SILNOTOCHNOJ ELEKTRONIKI SO AN SSSR) 7 June 1983 (1983-06-07) figures 1,2	
A	EP 0 924 742 A (PICKER INTERNATIONAL, INC; MARCONI MEDICAL SYSTEMS, INC) 23 June 1999 (1999-06-23) column 4, line 25 - line 33 column 6, paragraph 0020; figure 2	

INTERNATIONAL SEARCH REPORT

Int Application No
PCT/GB2004/001731

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2001176408 A	29-06-2001	NONE	
EP 0432568 A	19-06-1991	EP 0432568 A2 JP 4144045 A	19-06-1991 18-05-1992
JP 04079128 A	12-03-1992	NONE	
US 4887604 A	19-12-1989	NONE	
US 3239706 A	08-03-1966	NONE	
EP 0584871 A	02-03-1994	DE 4228559 A1 DE 59304524 D1 EP 0584871 A1 JP 6162972 A	03-03-1994 02-01-1997 02-03-1994 10-06-1994
SU 1022236 A1	07-06-1983	NONE	
EP 0924742 A	23-06-1999	US 6005918 A DE 69814574 D1 DE 69814574 T2 EP 0924742 A2 JP 11273597 A	21-12-1999 18-06-2003 18-03-2004 23-06-1999 08-10-1999